



**607th Weather
Squadron**

Republic of Korea Aviation Leaders Course:

Weather Computer- Based Training Module



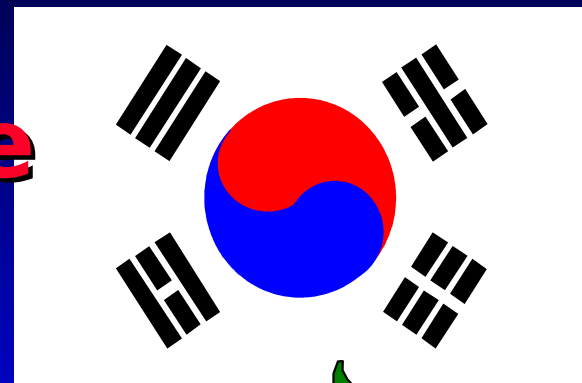
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- The purpose of this Weather Computer Based Training (CBT) module is to familiarize you, the pilot, with common weather you may encounter while flying in the Republic of Korea (ROK).
- At the end of the CBT, there will be a multiple choice exam to test your knowledge of Korean weather and its impacts.



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Training Outline



- **This CBT will cover the following items:**
 - Seasonal Weather Conditions in ROK
 - Commonly Encountered ROK Flight Hazards
 - Weather/Terrain Impacts on Flying Routes
 - Observation Density Limitations
 - Pilot Reports (PIREPS) ... Why? How?
 - Forecasting Function and Responsibilities
 - End of Module Exam





607th Weather Squadron Seasonal Weather

- **Fall brings cooler weather to the ROK with generally favorable flying conditions. However, transient low pressure systems do impact flying operations several days per month. Icing and turbulence are the most common hazards during the fall season**
- **Winter brings cold weather to the ROK with an average of two days/month with ceilings less than 500'. Icing and turbulence are the most common flight hazards in winter, as they are in fall. Overall, the best flying weather in Korea occurs during winter**



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● Major Fall/Winter Weather Patterns

→ There are 2 basic types of systems that affect Korea during the fall/winter seasons:

* Low Pressure/Frontal Systems

- ▲ Form W-NW of ROK, move E-SE over ROK
- ▲ Associated with low ceilings, poor visibilities, and precipitation (rain, snow, etc.)

* High Pressure Systems

- ▲ Generally move in behind cold fronts from the NW and slowly migrate to the E or SE
- ▲ Associated with cold temperatures and mountain wave turbulence
- ▲ Usually produce good flying weather



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- Here are some **general** weather rules of thumb for the fall/winter seasons:
 - Higher winds and increased cloudiness more prevalent, especially near west coast
 - Ground freezes in mid December and thaws in mid February
 - Visibilities are generally best in winter
 - Mountain wave turbulence presents a large threat during these seasons



607th Weather Squadron Seasonal Weather

- **Spring brings cool temperatures and poor weather from transient low pressure systems. Yellow wind (explained later) and sea fog present the greatest danger to flight during the spring season**
- **Summer brings warm temperatures and fair flying conditions in June. In July and August, the summer monsoon sets up, with frequent periods of low ceilings, visibilities and heavy rains. The monsoon season yields the poorest flying conditions of the year**



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● Major Spring/Summer Weather Patterns

→ There are 4 basic types of systems that affect Korea during the spring/summer seasons

*** Low Pressure/Frontal Systems become less frequent as summer approaches, but still a factor**

▲ Form W-NW of ROK, move E-SE over ROK

▲ Associated with low ceilings, poor visibilities, and precipitation (rain, snow, etc.)

*** High Pressure Systems**

▲ Generally build in behind low pressure systems or summer monsoon (Changma)

▲ Usually produce good flying weather



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- **Major Spring/Summer Weather Patterns (cont.)**
 - * **Yellow Wind Dust Events**
 - ▲ **Generally occur in March through May**
 - ▲ **Dust from the Gobi Desert migrates into the ROK, reducing visibilities significantly**
 - ▲ **Generally brings very poor flying conditions**
 - * **Summer Monsoon (Changma)**
 - ▲ **Brings low ceilings, visibilities and heavy rains**
 - ▲ **Generally brings very poor flying conditions and flash flooding**



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- Here are some **general** weather rules of thumb for the spring/summer seasons:
 - Yellow wind events normally 2-3 times each spring
 - ▢ Worst flying conditions of the year occur during the summer monsoon (Changma)
 - ▢ Flash flooding common during Changma
 - ▢ Thunderstorms possible during late spring and into the summer



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Hazards

**We will now review the following
weather hazards to flying
operations in the ROK:**

- Turbulence**
- ▢ Low-Level Wind Shear**
- ▢ Icing**
- ▢ Thunderstorms**
- ▢ Restrictions to Visibility**



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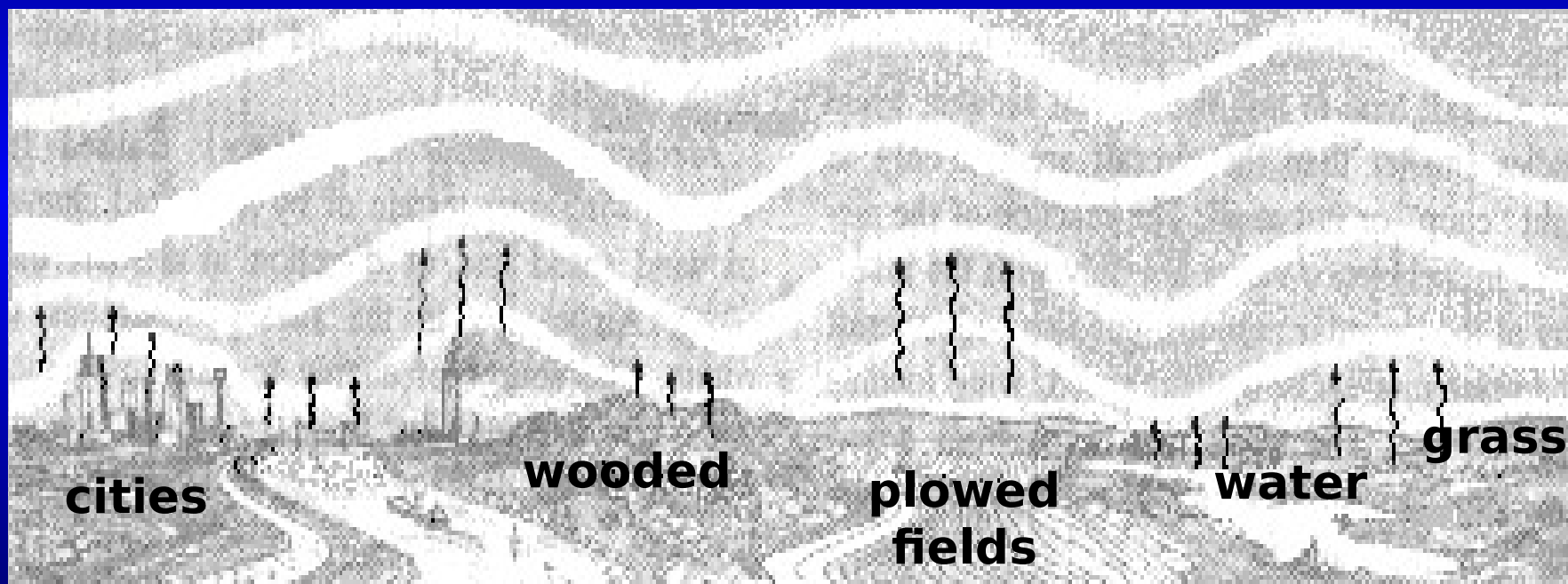
- **Turbulence** is caused by irregular movements of air in the atmosphere. These abrupt movements jar an aircraft, creating additional stress on the airframe and pilots/passengers
- **Turbulence** is categorized as either:
 - Thermal - Due to surface heating
 - ▮ Mechanical - Due to vertical/horizontal shear



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- **Thermally-Induced Turbulence**

- Occurs when warm air rises to create eddies and gusts which cause "rough air"



- Turbulence strength is determined by the amount of differential surface heating and air stability

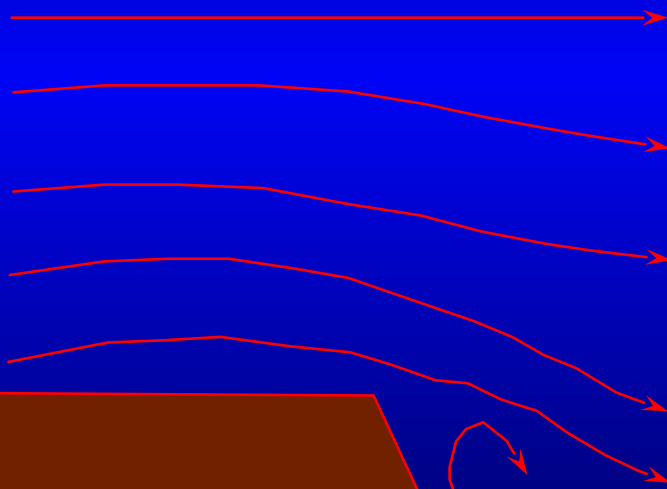


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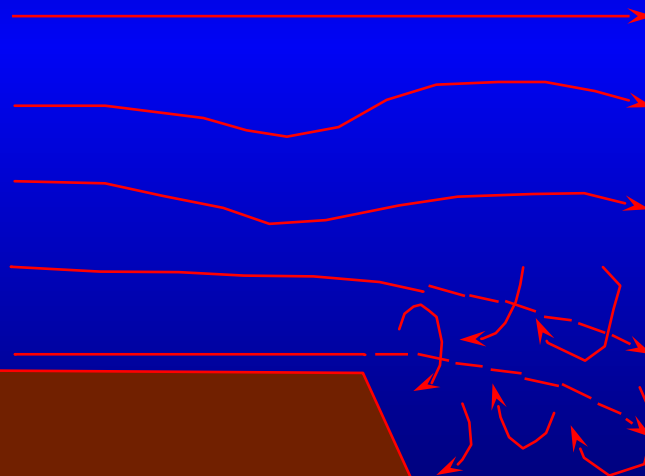
Mechanically-Induced Turbulence

- Occurs when stronger winds encounter terrain obstructions (see figure) or in regions where wind direction or speeds changes rapidly

SPEED BELOW 20KTS



SPEED ABOVE 20KTS

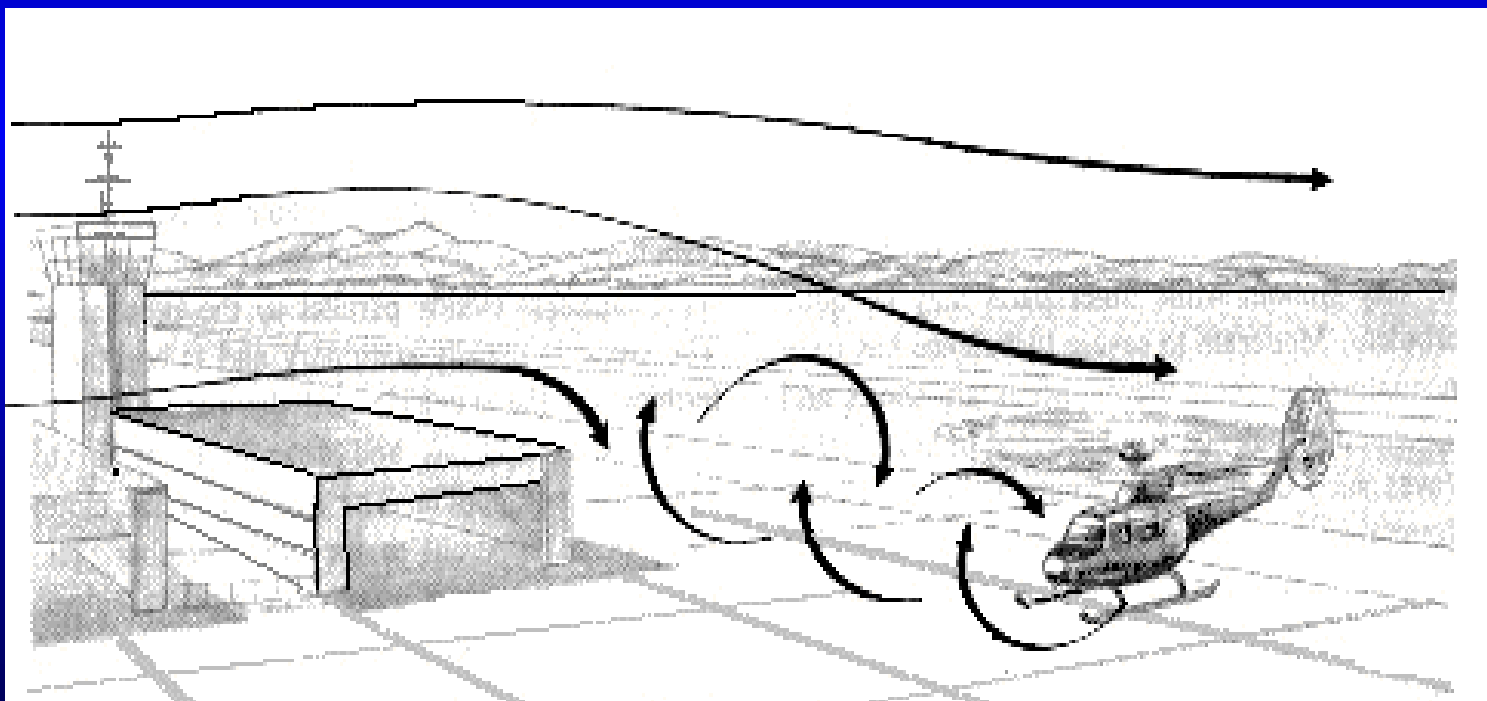


Example of Turbulence Created by Wind Flow Over Rough Terrain



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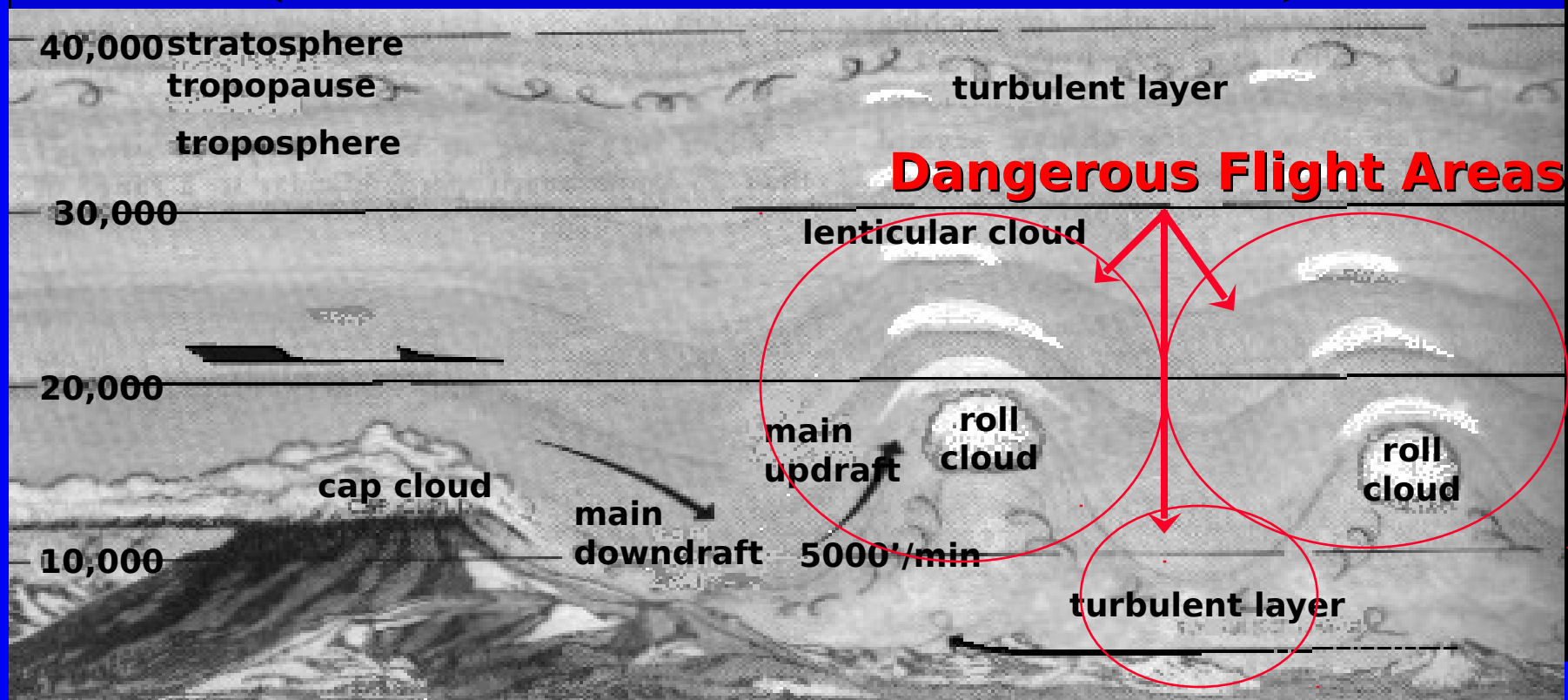
- **Localized Mechanical Turbulence** can occur when obstacles cause eddies in the wind flow





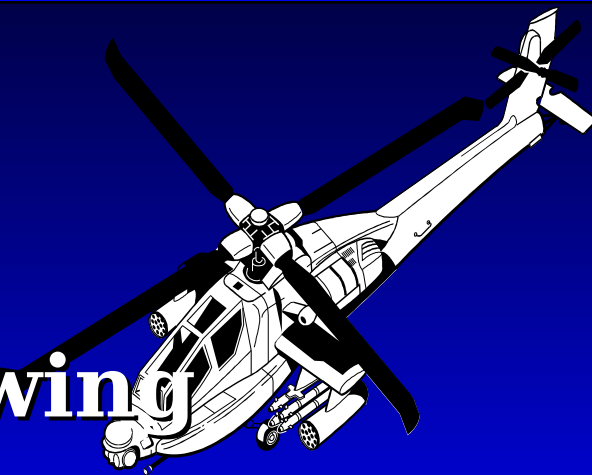
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Mechanical turbulence is most intense when terrain is very rough and wind speeds are strong (Mountain Wave Turbulence)





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- For rotary and fixed-wing aircraft, turbulence is:
- * Directly proportional to aircraft speed
 - * Inversely proportional to aircraft weight
 - * Directly proportional to rotor blade area or fixed-wing surface area



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- **Low-Level Wind Shear (LLWS)** is defined as a sudden change in wind direction or speed (vertically and/or horizontally) below 2000 feet
 - LLWS dramatically/rapidly changes the lift properties of an aircraft
 - LLWS is extremely dangerous because it can quickly overcome a pilots' ability to control an aircraft, both rotary and fixed wing



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- Below is an illustration of an aircraft encountering low level wind shear
 - ▢ The aircraft has a 50kt headwind while on approach
 - ▢ While descending, the aircraft will enter an area of 15kt headwinds. **LIFT WILL DECREASE DYNAMICALLY!**





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- **Icing** occurs when water droplets freeze on aircraft surfaces. This causes airfoils to lose their aerodynamic form and adds weight to the aircraft. Icing is:
 - Included in terminal aerodrome forecast (TAF) if icing is from surface to 10,000'
 - ▢ Included on DD Form 175-1 if icing is within 5,000' of flight level
 - ▢ Briefed to pilots if considered important to flight safety



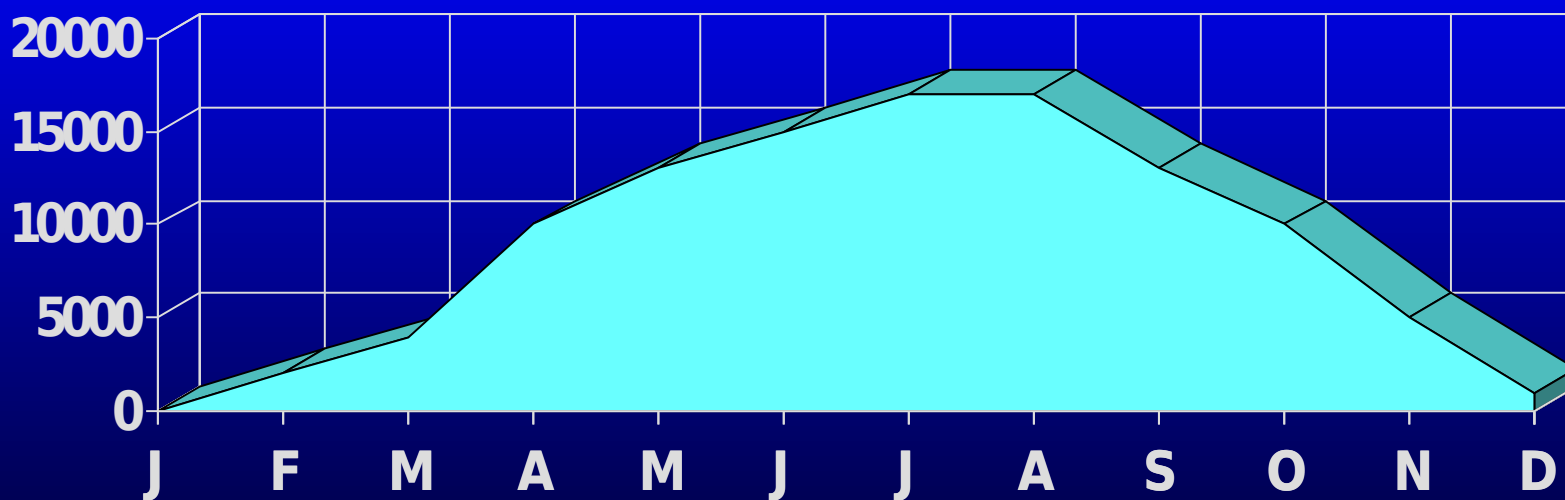
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- **Icing normally occurs in the vicinity of frontal and low pressure systems, and in thunderstorms**
 - **Clear icing occurs when rain falls through a cold (below freezing) layer of air**
 - **Mixed and clear icing is most prevalent in cumuliform clouds**
 - **Rime icing is most commonly encountered in stratiform clouds**



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- Icing is most commonly encountered from October thru March in the ROK
- The graph below shows the average freezing level by month





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- **Thunderstorms** are caused by strong rising air currents and produce heavy rain and/or hail along with lightning and thunder
- Most dangerous when in a continuous line; this doesn't occur to often in ROK
- Individual or single, scattered thunderstorms are more common in Korea



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- **Thunderstorms produce the following weather hazards:**
 - ▢ **Severe turbulence & icing**
 - ▢ **Heavy rains**
 - ▢ **Hail**
 - ▢ **Lightning**
 - ▢ **Tornadoes**
 - * **Rare, but can occur in Korea**
 - ▢ **Bottom Line: Avoid Thunderstorms!**



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Restrictions to Visibility

- **Fog, Haze and Smoke** are almost always present in Korea. These present the most common and constant threat to aviation in the Korean AO. Fog, haze and smoke:
 - Restrict visibility, obscuring obstructions to flight
 - Vary from valley to valley
 - Pose a challenge to forecasters due to rapidly changing conditions and limited observing capabilities

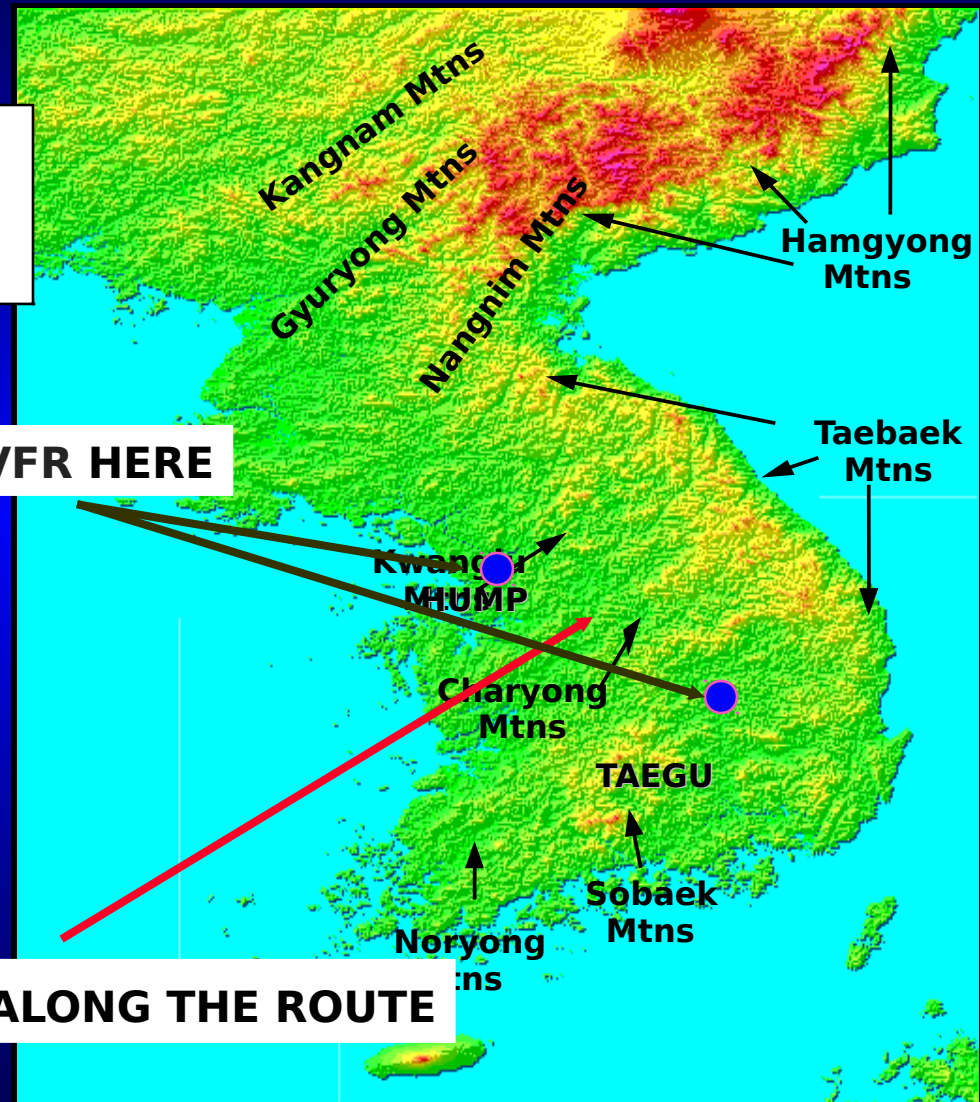


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TERRAIN
HAS A BIG INFLUENCE ON
FLIGHT WEATHER IN KOREA

JUST BECAUSE THE WEATHER IS VFR HERE

DOESN'T MEAN IT WILL BE VFR ALONG THE ROUTE



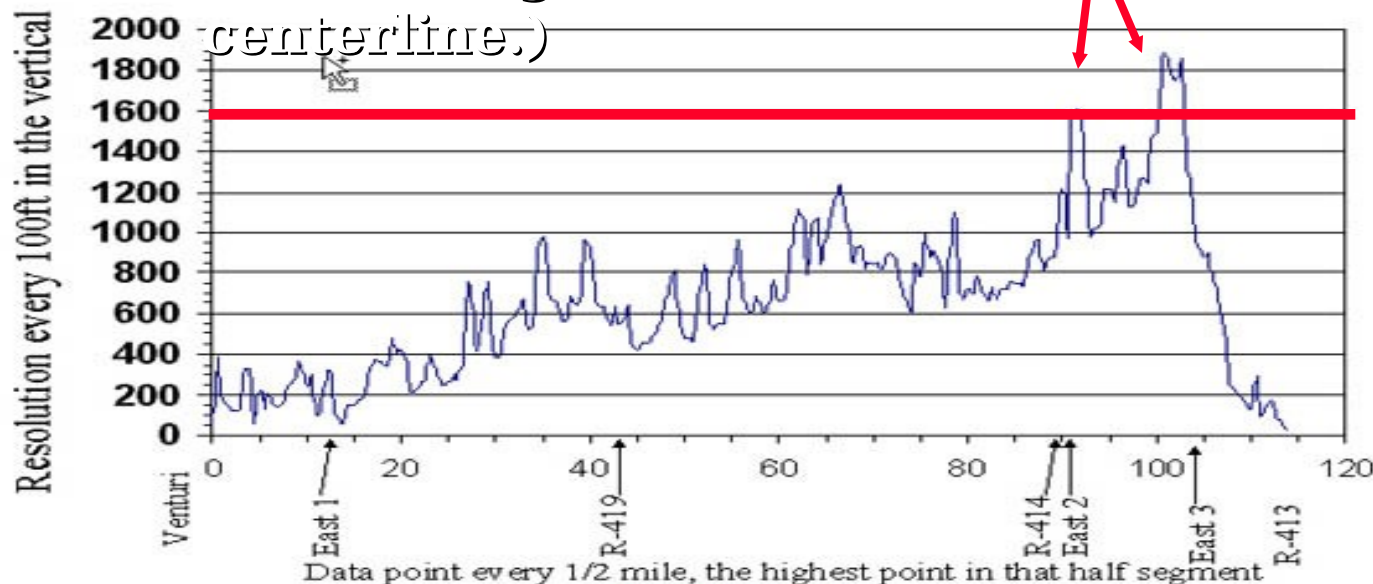


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- Flight routes have varying terrain elevations. This is critical when low ceilings are present

- In the below example, ceilings of 1600' would present a hazard because mountain tops would be obscured (Note:

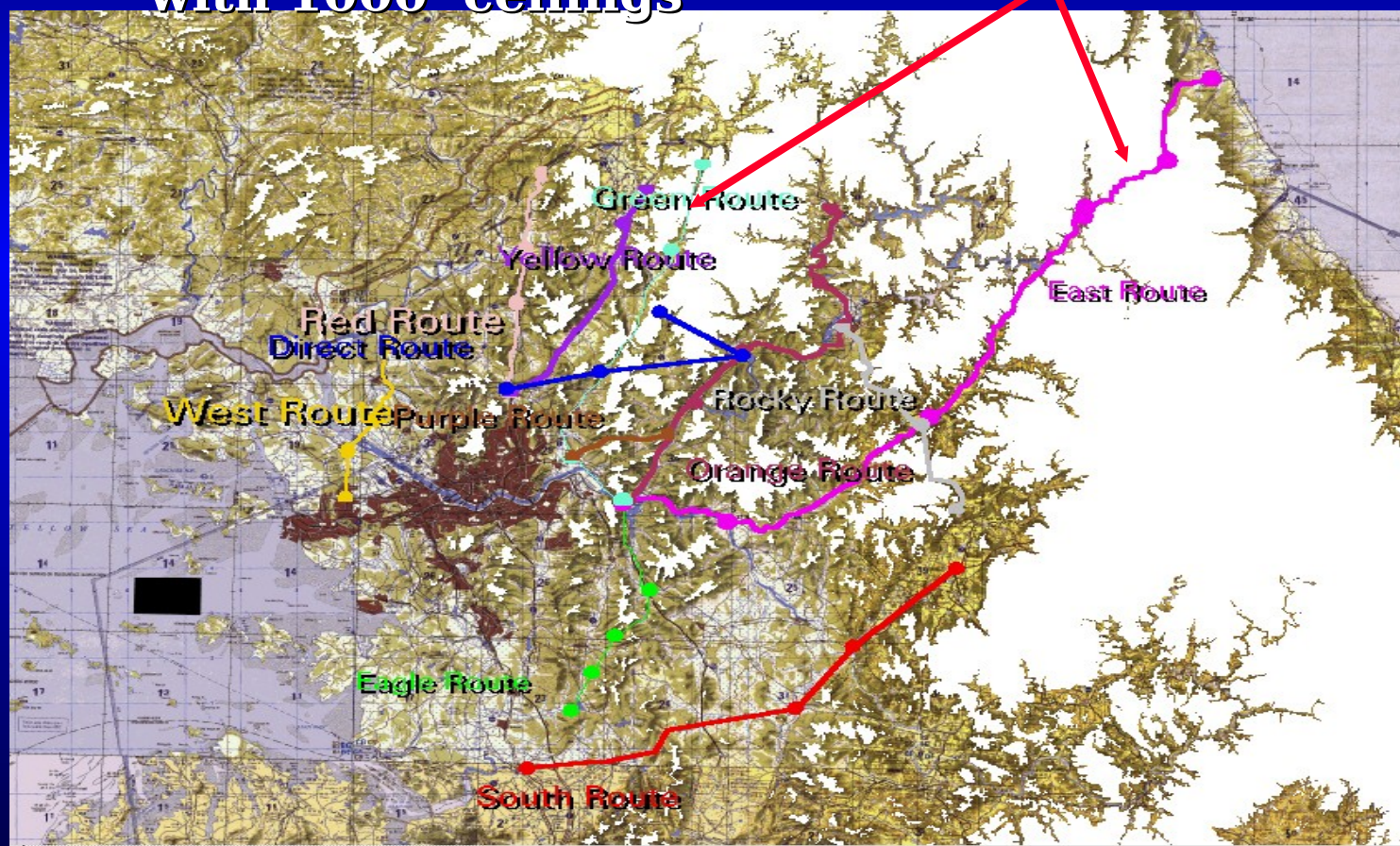
Altitudes shown do not take into account flight variances from route centerline.)





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• The below example shows how both **Green Route** and **East Route** would be impassible with 1000' ceilings

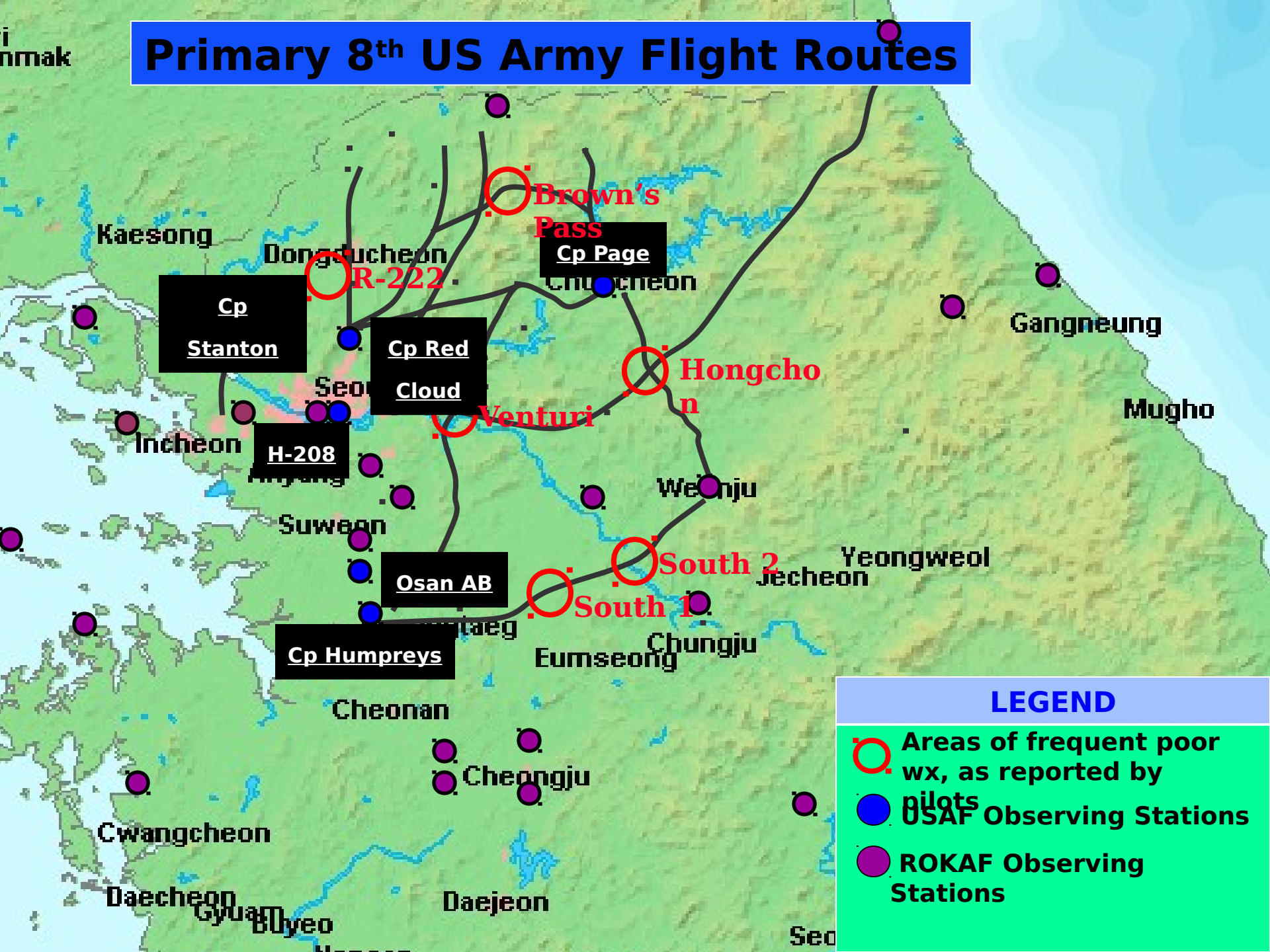




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- **Low Observation Density** is the #1 limiting factor for weather service to military aviation operations in ROK
 - Lack of observations along flight routes greatly reduces forecast accuracy
 - ▢ Rocky terrain and variable conditions between different valleys exacerbates this lack of observations. PIREPS help a forecaster overcome this shortfall
 - ▢ The following slide depicts commonly encountered choke-points along flight routes where weather is often worse than forecasted

Primary 8th US Army Flight Routes





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- **PIREPS** are the most important feedback a pilot can give to the forecaster.
PIREPS aid in:
 - **Filling data gaps**, thereby improving forecasts
 - ▢ Providing forecasters with a “eyes forward picture” of the flight route
 - ▢ Increasing flight safety for fellow aviators by giving a “heads-up” about hazardous weather conditions
- **PIREP Frequency for the ROK: UHF 346.5**



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- **When passing along a PIREP, please include the following information:**
 - **Location, flight level, aircraft type**
 - **Cloud elevations and coverage (SCT, BKN, OVC)**
 - ▢ **Visibility and obstruction type (fog, smoke)**
 - ▢ **Temperature, wind direction and speed**
 - ▢ **Turbulence and intensity**
 - ▢ **Type of icing and intensity**
 - ▢ **Any descriptive remarks**

 - ▢ **Substance is more important than form. Give additional attention to hazardous elements**



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- **Single Element PIREPS should be given when time does not allow for a full PIREP yet weather is significant enough to present a hazard to flight**
 - **Some examples:**
 - * **Encounters with thunderstorms/hail**
 - * **Visibilities lower than forecast**
 - * **Icing or turbulence**
- **Always include location and time!**



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- **Pilots are required to update flight weather briefings as required by Army regulations, 8th Army Supplements and and unit policies**
 - **You may contact your weather station to update your weather briefing via:**
 - * **Phone**
 - * **Fax**
 - * **PMSV**
 - * **Phone Patch**
 - * **Or in-person**



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Use the below numbers to
contact your local weather
forecaster/briefer



607th Weather Squadron Weather Briefing Numbers



Cp Stanley:

DSN - 732-5417

Com - 031-870-5417

FAX - 732-5604

Cp Stanton:

DSN - 723-5975

Com - 031-940-5988

FAX - 734-5065

Cp Page:

DSN - 721-5874

Com - 033-259-5874

FAX - 721-5072

Cp Humphreys

(24hr):

DSN - 753-7743

Com - 031-690-7740

FAX - 753-6490

Cp Eagle:

DSN - 721-2200

Com - 033-738-2200

FAX - 721-2233

K-16 AB:

DSN - 741-6282

Com - 031-720-6862

FAX - 741-6346

Korea Wide PMSV Frequency
UHF 346.5

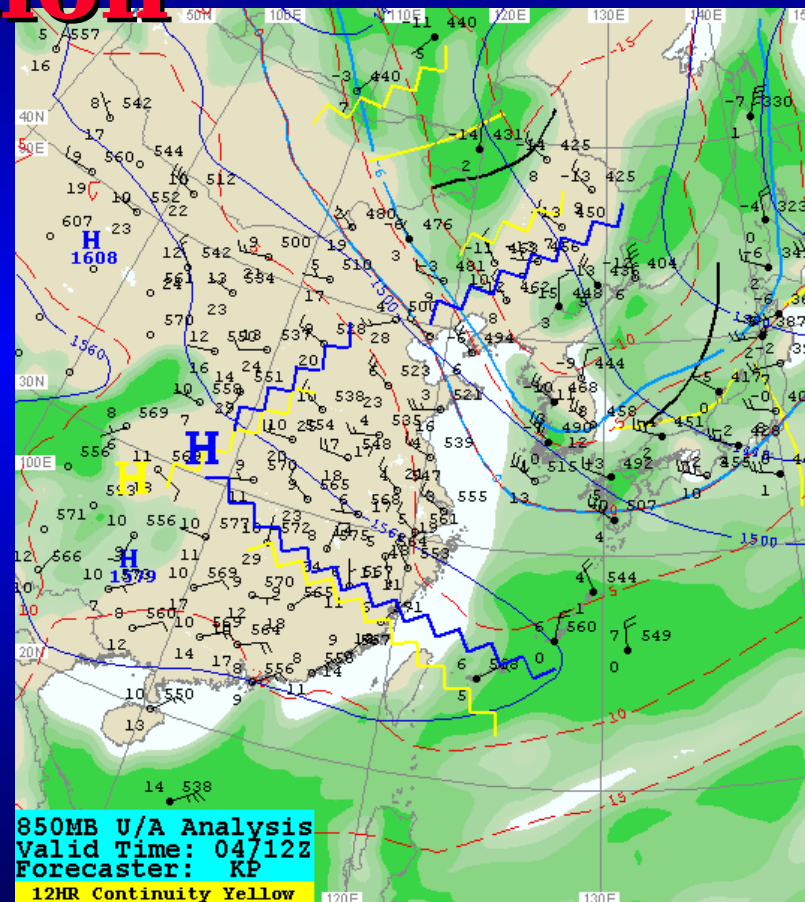
Please send us PIREPS!!



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Forecasting Function

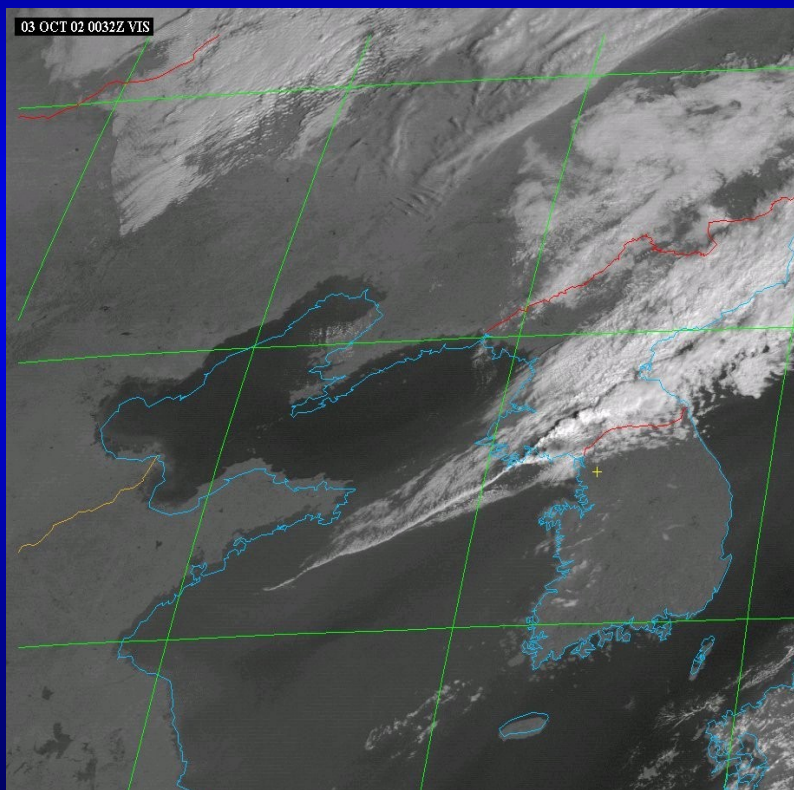
- Airfield forecasts are made by the 20th Operational Weather Squadron (OWS) at Yokota AB, Japan
- Forecasters in Korea coordinate with 20 OWS to produce weather products for garrison and deployed locations





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Forecasting Function (cont.)



- **Local Forecasters:**
 - **Provide feedback to 20 OWS**
 - ▢ **Have direct input into final forecast product**
 - ▢ **Tailor products to support their customers' missions**



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CONCLUSION

- **Knowing weather hazards will increase flight safety**
 - Increased flight safety saves:
 - * Lives
 - * Resources
 - * Mission
- **Increase your weather awareness to increase YOUR safety!**





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**You have completed the
ROK Weather CBT**

**Please proceed to the end-
of-module exam**